

## Comparison of mental health between individuals with spinal cord injury and able-bodied controls in Neiva, Colombia

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**Abstract**—Although research has investigated the mental health of individuals with spinal cord injury (SCI), an overwhelming majority of this research has been conducted in the United States, Western Europe, and other developed countries. The purpose of this study was to compare the mental health of individuals with SCI with able-bodied controls in Neiva, Colombia, South America. Subjects included 40 Colombians with SCI and 42 age- and sex-matched controls ( $N = 82$ ). The groups did not differ based on age, sex, years of education, or socioeconomic status. However, controls were twice as likely to be married. Four measures assessed mental health, including satisfaction with life (Satisfaction with Life Scale), depressive symptoms (Patient Health Questionnaire-9), self-esteem (Rosenberg Self-Esteem Scale), and anxiety (State-Trait Anxiety Inventory). In comparison with able-bodied controls, individuals with SCI reported significantly lower mental health on both depressive symptoms and satisfaction with life. These effect sizes were medium and large, respectively. The groups did not differ significantly on measures of self-esteem or anxiety. Mental health of individuals with SCI should be considered a central part of SCI rehabilitation interventions, particularly in Latin America.

**Key words:** anxiety, Colombia, depression, Latin America, mental health, persons with disabilities, rehabilitation, satisfaction with life, self-esteem, spinal cord injury.

## INTRODUCTION

Spinal cord injury (SCI) can be a life-altering event with a tremendous effect on the injured individual in multiple life domains. SCI is a chronic disorder that often begins with a traumatic injury to the spine and ends with damage to the spinal cord or nerves [1]. Globally, the average age of injury is 33 yr [2], and due to its sudden occurrence, individuals are often unprepared to cope with the emotional, financial, and physical consequences of the injury and the subsequent disabilities. Motor vehicle collisions are the leading cause of SCI in developed countries like the United States, whereas in developing countries like Colombia, violence and falls from heights are more frequent causes [3].

**Abbreviations:** ANOVA = analysis of variance, IRB = institutional review board, MANOVA = multivariate analysis of variance, PHQ-9 = Patient Health Questionnaire-9, QoL = quality of life, RSES = Rosenberg Self-Esteem Scale, SCI = spinal cord injury, SD = standard deviation, STAI = State-Trait Anxiety Inventory, SWLS = Satisfaction with Life Scale.

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While the prognosis and life expectancy of individuals with SCI continue to improve, the effects are especially challenging for individuals in less-developed countries because outpatient rehabilitation hospitals, assistive technology, and other vocational rehabilitation services are extremely limited. Individuals with SCI generally have complicating medical conditions subsequent to the SCI that can permanently alter their lives. Medical complications may include bladder cancer, gallstones, renal stones, spasticity, problems with sexual functioning [4], recurrent pain, urinary tract infections, and ventilator dependence [1]. These complications may not only introduce a significant financial burden but can also complicate social and community reintegration [5].

In part because of this plethora of common medical issues, individuals with SCI may experience high levels of emotional distress related to their loss of independence and autonomy [6], the disruption in vocational advancement [7], deficits in physical functioning, and the resulting effect on social and intimate relationships [8]. Perhaps as a result, individuals with SCI have an increased risk of psychological and neurobehavioral problems such as anxiety, depression, and substance abuse [5,9]. Suicide rates for individuals with SCI in the United States are between two to six times higher than in the general population [10]. The prevalence of depression in individuals with SCI has been found to range from 8 to 60 percent, has been linked to lower satisfaction with life, and has been found to persist over time for many individuals [11–13]. However, other researchers argue that depression develops only in a minority of individuals with SCI and changes dramatically across time since injury [14].

Directly related, pain and fatigue have been found to affect the rehabilitation process for individuals with SCI [15]. The prevalence of fatigue in individuals with long-term SCI is approximately 25 percent, and fatigue can result in higher depression and lower self-efficacy [16–17]. Systematic reviews have indicated that negative affect is significantly associated with lower quality of life (QoL) and higher posttraumatic stress [18]. Psychiatric conditions such as these create barriers to rehabilitation and recovery, resulting in diminished QoL, increased risk for pain, and secondary medical complications [19].

Systematic reviews of mental health problems in individuals with SCI suggest that major depression, anxiety disorders, posttraumatic stress disorder, and substance abuse are extremely common [20]. Depression has been one of the more widely studied mental health concerns for

individuals with SCI [12] and has been found to be significantly different than matched noninjured comparison groups [21]. Depressive symptoms have also been linked to other medical complications such as decubitus ulcers and urinary tract infections [22], as well as increased hospital stays, increased mortality, increased morbidity, and reduced functional improvements in rehabilitation [23].

Fewer studies have examined anxiety, satisfaction with life, and self-esteem in individuals with SCI. Research examining clinically significant anxiety in individuals with SCI shows that prevalence rates range from 13 to 40 percent and are significantly higher than in general comparison populations [12]. Research comparing anxiety levels in individuals with SCI with able-bodied comparison groups also show significant differences [21]. Rates tend to vary depending on time postinjury and individual differences. Lastly, research on self-esteem in individuals with SCI has shown mixed results [24].

Although a substantial amount of research has investigated the mental health of individuals with SCI, an overwhelming majority of this research has been conducted in the United States, Western Europe, and other developed countries. The incidence of traumatic SCI in Latin America is higher than in Western Europe and Australia, but lower than in the United States [25]. Few studies have examined whether racial, cultural, or global differences are present in the mental health of individuals with SCI [26]. However, research has found that white Americans with SCI report higher subjective well-being with regard to employment opportunities than African Americans, American Indians, and Latino Americans [27]. Latino Americans with SCI in the United States have been found to have higher rates of depression than white Americans and African Americans [26]. Research has also found that white individuals post-SCI have better employment outcomes than individuals from minority groups [26].

Given unique cultural, economic, and interpersonal differences, it is plausible that mental health could differ considerably among individuals with SCI in developing countries, such as Colombia. As such, the goal of the present study is to compare the mental health of individuals with SCI with a able-bodied comparison group in Neiva, Colombia, South America. We hypothesized that the mental health of individuals with SCI will be significantly lower than controls on measures of depressive symptoms, anxiety, self-esteem, and satisfaction with life.

## METHODS

### Participants

Forty Colombian individuals with SCI were recruited from the Foundation for the Integral Development of People with Disabilities, a nonprofit organization that assists individuals with a variety of physical disabilities living in Neiva, Colombia. The age of the individuals with SCI was  $34.8 \pm 11.0$  yr (mean  $\pm$  standard deviation [SD]), and 92.5 percent were male. More than half (65.0%) were single, with an average of  $10.0 \pm 4.6$  yr of education. Of the participants, 57.5 percent were at level 2 socioeconomic status as defined by the Colombian government (the Colombian government has defined 6 levels of socioeconomic status based on individual's income and location of residence, where level 1 = the lowest resources and QoL and 6 = highest). The time since injury was  $142.6 \pm 104.0$  mo, with 55.0 percent diagnosed with paraplegia and 35.0 percent of injuries resulting from violent events.

### Controls

The control group was comprised of 42 individuals recruited through flyers and by general word of mouth. Their age was  $35.6 \pm 11.0$  yr, 90.5 percent of whom were male. Of the participants, 28.6 percent were single and 54.8 percent were at level 2 socioeconomic status, with an average of  $9.9 \pm 4.2$  yr of education.

### Instruments

#### *Satisfaction with Life Scale*

The Satisfaction with Life Scale (SWLS) is a self-report questionnaire that assesses global life satisfaction [28]. The instrument consists of five items that the participant rates on a scale from 1 (strongly disagree) to 7 (strongly agree). Higher scores indicate a higher satisfaction with life. This study used the Spanish-language version of the SWLS, which has good psychometric properties [29–30].

#### *Patient Health Questionnaire-9*

The Patient Health Questionnaire-9 (PHQ-9) is self-report measure that assesses depressive symptoms [31]. This scale consists of nine items that individuals rate using a 4-point Likert scale, where 0 = not at all and 3 = nearly every day. Scores are summed and range from 0 to 27, with higher scores indicating higher levels of depressive symptoms. Respondents indicate how often they

have been bothered by each of the items over the previous 2 wk. The Spanish-language version of the PHQ-9 was used in this study and has been found to be reliable and valid [32].

#### *Rosenberg Self-Esteem Scale*

The Rosenberg Self-Esteem Scale (RSES) is a self-report questionnaire consisting of 10 items that assess self-esteem [33]. The respondents rate their overall sense of worth on a 4-point Likert scale, where 1 = strongly disagree and 4 = strongly agree [34], with total scores ranging from 10 to 40. Higher scores represent higher self-esteem, and a score of  $<25$  suggests clinically significant low self-esteem [35]. The RSES is a reliable and valid measure that has shown good internal reliability with cross-cultural use in Latin America [34,36].

#### *State-Trait Anxiety Inventory*

The State-Trait Anxiety Inventory (STAI) is a 20-item self-report measure of anxiety. The questionnaire includes two scales: the S-Anxiety scale that assesses anxiety as an emotional state and the T-Anxiety scale that assesses anxiety as a personality trait [37]. Each scale has response options ranging from 0 (almost never) to 3 (almost always). The total score, which was used in this study, ranges from 0 to 120, and higher scores indicate higher levels of anxiety. The Spanish-language version has strong psychometric properties [38–39].

### Procedure

Institutional review board (IRB) approval for this study was obtained from Surcolombiana University in Neiva, Colombia, and all approved informed consent and data privacy procedures were followed. The Foundation for the Integral Development of People with Disabilities is the only community resource available for individuals with physical disabilities living in Neiva and serves as a meeting place, social work organization, advocacy group, counseling service, and social support network. Research staff reviewed records at the Foundation in order to identify persons who had sought services for SCI between January 2005 and December 2008. Inclusion criteria required participants to have been diagnosed with an SCI after the age of 18; be at least 6 mo postinjury; and have no psychiatric problems, neurological problems, or history of drug and/or alcohol abuse according to Diagnostic and Statistical Manual-4th edition substance abuse criteria [40].

Out of a possible 42 patients identified in the medical records review, 2 had a reported history of drug or alcohol abuse and were excluded. The other 40 patients were called at home and invited to participate after receiving information about the study. All 40 individuals with SCI agreed to participate, comprising the full convenience SCI subsample used in this study. Controls were recruited from the same community as individuals with SCI through flyers at restaurants, churches, and stores, as well as by word of mouth.

All interviews were conducted in participants' homes by one of two psychologists, who both had an SCI themselves. The psychologists were supervised directly by a university professor. Participants gave informed consent under the IRB-approved protocol and then orally provided sociodemographic information. They then orally completed the study measures, and interviews lasted between 30 and 45 min.

### Statistical Analysis

Demographics for patients and controls were compared using *t*-tests for continuous variables and chi-square tests for nominal variables (**Table 1**). Demographic variables with statistically significant differences between patients and controls were compared in their prediction of the mental health variables under scrutiny to determine whether they should be covaried. In order to control for family-wise error, a multivariate analysis of variance (MANOVA) was conducted with participant status (patient vs control) as the independent variable and the four mental health indices of satisfaction with life, depressive symptoms, self-esteem, and anxiety as the dependent variables. A power analysis with  $n = 82$  was conducted using G\*Power version 3 (Heinrich-Heine-Universität Düsseldorf; Düsseldorf, Germany) and determined that the MANOVA could detect ( $f^2 = 0.25$ ) most medium and all large effect sizes, having an actual power ( $1 - \beta$ ) of 0.95. Follow-up one-way analyses of variance (ANOVAs) were conducted to compare individuals with SCI and able-bodied controls on each mental health variable. For reference, **Table 2** presents a correlation matrix showing the bivariate relationships between all dependent variables in the study. The data were analyzed using the statistical package SPSS, version 20 (IBM Corporation; Armonk, New York).

### RESULTS

Normality assumptions were checked and met for all variables except for controls' scores on the PHQ-9 depressive symptom inventory (skewness = 1.85, kurtosis = 4.15). Because this variable was only slightly skewed and the only variable that departed from a normal distribution, it was not transformed.

Individuals with SCI and able-bodied controls had similar mean ages, sex distribution, years of education, and socioeconomic status levels (**Table 1**). Marital status was recoded with married and cohabiting individuals coded as partnered, and all other individuals coded as not partnered. Able-bodied controls were significantly more likely to be partnered than individuals with SCI (**Table 1**). When this effect was examined further, individuals with SCI were more likely to be single (65.0%) than controls

**Table 1.**  
Participant demographics.

Variable	Individuals with SCI ( <i>n</i> = 40)	Able-Bodied Controls ( <i>n</i> = 42)	<i>p</i> -Value
Age, yr (mean ± SD)	34.8 ± 11.0	35.6 ± 11.0	NS
Sex (%)			NS
Male	92.5	90.5	
Female	7.5	9.5	
Marital Status* (%)			0.01
Single	65.0	28.6	
Married	17.5	38.1	
Divorced	0.0	2.4	
Separated	0.0	2.4	
Widow	0.0	2.4	
Cohabiting	17.5	26.2	
Education, yr (mean ± SD)	10.0 ± 4.6	9.9 ± 4.2	NS
Socioeconomic Status† (%)			NS
Level 1	22.5	23.8	
Level 2	57.5	54.8	
Level 3	10.0	11.9	
Level 4	10.0	9.5	
Level of Injury (%)			—
Tetraplegia	45.0	—	
Paraplegia	55.0	—	
Cause of Injury (%)			—
Violent	35.0	—	
Nonviolent	65.0	—	
Time Since Injury, mo (mean ± SD)	142.6 ± 104.0	—	—

\*Marital status tested as partnered (yes/no).

†Colombian government defines 6 levels of socioeconomic status based on individual's income and location of residence, where level 1 = lowest resources and quality of life and 6 = highest.

NS = nonsignificant ( $p > 0.05$ ), SCI = spinal cord injury, SD = standard deviation.

**Table 2.**  
Correlation matrix.

Participants	Satisfaction with Life (SWLS)	Depressive Symptoms (PHQ-9)	Self-Esteem (RSES)	Anxiety (STAI)
Individuals with SCI				
Satisfaction with Life	—			
Depressive Symptoms	-0.359*	—		
Self-Esteem	0.270*	-0.591 <sup>†</sup>	—	
Anxiety	-0.376 <sup>†</sup>	0.726 <sup>†</sup>	-0.737 <sup>†</sup>	—
Able-Bodied Controls				
Satisfaction with Life	—			
Depressive Symptoms	-0.370 <sup>†</sup>	—		
Self-Esteem	0.417 <sup>†</sup>	-0.531 <sup>†</sup>	—	
Anxiety	-0.428 <sup>†</sup>	0.770 <sup>†</sup>	-0.522 <sup>†</sup>	—

\*Significant at 0.05 level.  
<sup>†</sup>Significant at 0.01 level.  
 PHQ-9 = Patient Health Questionnaire-9, RSES = Rosenberg Self-Esteem Scale, SCI = spinal cord injury, STAI = State-Trait Anxiety Inventory, SWLS = Satisfaction with Life Scale.

(28.6%), and controls (38.1%) were nearly twice as likely to be married as individuals with SCI (17.5%).

Since the two groups differed based on partnership status, a MANOVA was run with partnership status as the independent variable (single vs partnered) and satisfaction with life, depressive symptoms, self-esteem, and anxiety as the dependent variables. Because this MANOVA was not statistically significant ( $F(4,77) = 0.48$ ,  $p = 0.75$ ), partnership status was not covaried in the analyses comparing the mental health of individuals with SCI with that of controls.

Thus, a MANOVA was conducted in which the independent variable was participant status (patient vs control), and the dependent variables were satisfaction with life, depressive symptoms, self-esteem, and anxiety. The homogeneity of variance assumption was checked using Levene tests, and all were nonsignificant. The overall MANOVA was statistically significant ( $F(4,77) = 9.66$ ,  $p < 0.001$ ), so

follow-up ANOVAs were run to determine the precise location of the significant differences between individuals with SCI and able-bodied controls. Individuals with SCI (mean  $\pm$  SD:  $16.6 \pm 7.0$ ) compared with controls ( $22.1 \pm 6.2$ ) had significantly lower scores for satisfaction with life ( $F(1,80) = 14.19$ ,  $p < 0.001$ ). Additionally, individuals with SCI ( $6.3 \pm 4.2$ ) compared with able-bodied controls ( $4.0 \pm 3.7$ ) had significantly higher scores for depressive symptoms ( $F(1,80) = 7.08$ ,  $p = 0.01$ ). However, individuals with SCI ( $33.9 \pm 4.3$ ) compared with able-bodied controls ( $32.2 \pm 4.7$ ) did not have significantly different self-esteem scores ( $F(1,80) = 2.63$ ,  $p = 0.11$ ). Individuals with SCI ( $34.9 \pm 19.1$ ) compared with able-bodied controls ( $34.8 \pm 18.4$ ) also did not have significantly different anxiety scores ( $F(1,80) = 0.268$ ,  $p = 0.98$ ). See **Table 3** for effect sizes.

## DISCUSSION

The purpose of this study was to compare the mental health of individuals with SCI in Colombia with a able-bodied comparison group. As compared with controls, individuals with SCI had lower satisfaction with life and higher depressive symptoms but comparable levels of self-esteem and anxiety. Although there has been extensive research assessing depression in individuals with SCI, few studies have examined satisfaction with life, self-esteem, and anxiety. The vast majority of this research has been conducted in the United States, Western Europe, and other developed countries, with very little consideration for other global regions, like Latin America. As such, a lack of available information exists on the mental health issues faced by individuals with SCI in Colombia or other Latin American countries. The current study is the first to compare the mental health issues faced by persons with SCI with controls in Latin America.

**Table 3.**  
Mental health scores for individuals with spinal cord injury (SCI) and able-bodied controls.

Variable	Individuals with SCI (mean $\pm$ SD)	Able-Bodied Controls (mean $\pm$ SD)	F-Statistic	p-Value	Cohen <i>d</i>
Satisfaction with Life	16.6 $\pm$ 7.0	22.1 $\pm$ 6.2	14.19	<0.01	0.83
Depressive Symptoms	6.3 $\pm$ 4.2	4.0 $\pm$ 3.7	7.08	0.01	0.59
Self-Esteem	33.9 $\pm$ 4.3	32.2 $\pm$ 4.7	2.63	0.11	0.36
Anxiety	34.9 $\pm$ 19.1	34.8 $\pm$ 18.4	0.00	0.98	0.01

Note: Cohen *d* effect size: 0.20 = small, 0.50 = medium, and 0.80 = large; *p*-values are two-tailed.  
 SD = standard deviation.

This study's finding that individuals with SCI had significantly lower scores on satisfaction with life suggests that individuals with SCI in Colombia were less satisfied with their lives than able-bodied controls. This finding is consistent with previous research documenting that individuals with SCI experience lower levels of life satisfaction than the general population in other global regions [12]. Similarly, the finding that individuals with SCI had significantly higher scores on the PHQ-9 suggests that depressive symptoms often co-occurred with SCI in the current sample. This finding replicates the results found by Craig et al. that individuals with SCI in Australia experienced more depressive symptoms than age- and sex-matched controls [21]. The current study's findings also conform to the general literature identifying a high prevalence of depressive symptoms among individuals with SCI [9,12,20,22].

An interesting finding, contrary to what was expected in the current study, was that no significant differences emerged between self-esteem and anxiety scores between individuals with SCI and able-bodied controls. While these findings are consistent with previous research documenting no differences in self-esteem between individuals with SCI and controls in the United States [41], other studies have found that individuals with SCI experience poorer self-esteem and higher levels of anxiety than the general population [21]. Despite these mixed results regarding anxiety in individuals with SCI, some researchers have argued that in actuality, only a minority of individuals develop clinically significant anxiety after an SCI [14]. This assertion indeed found support in the current study.

These inconsistencies in the literature could be caused by a number of associated factors. Studies examining individuals with high levels of anxiety after SCI have found that increased anxiety was significantly associated with the traumatic event leading to the injury [9,21,42]. This finding bears on the current study in that only 35 percent of the injuries were a result of violence. Although anxiety disorders can also develop as a result of nonviolent trauma, violent events may produce a different constellation of anxiety symptoms than do other more common causes of SCI in Latin America, such as falls [3].

Another associated factor that could account for the lower anxiety scores found may be attributed to the time since injury. In the current study, the average time since injury was 142.6 mo, or roughly 12 yr. Research has found that although anxiety levels are high immediately following injury during hospitalization, these levels tend

to fall below clinical levels after discharge [9]. As such, the presence of lower anxiety scores in individuals with SCI in the current study may be because of the extended time since injury.

While there has been previous research showing that individuals with SCI have lower scores on measures assessing self-esteem [43–47], the current study is consistent with previous research suggesting that the longer the time period since the SCI, the higher the scores measuring self-esteem [43,46–49]. Again, longer time since injury could allow individuals with SCI more time to integrate SCI into their identity, contributing to higher self-esteem scores.

## LIMITATIONS AND FUTURE DIRECTIONS

One limitation to the current study was the limited sample of individuals with SCI and matched controls from Colombia. This sample size may have contributed to a lack of statistical significance for differences in the mental health variables of self-esteem and anxiety, because a power analysis suggested that the current sample would not be able to detect small effects or some medium-sized effects. Limited sample size is especially influential on tests of mean differences when scale scores have high variability. For example, participants had an STAI average score of 34.8 with an SD of 18.6, indicating high variability and obscuring possible mean differences.

A second limitation is characteristic of research on self-esteem, anxiety, and depressive symptoms after SCI more generally. The current study was unable to assess participants' premorbid psychological state and risk prior to SCI. It is possible that participants had specific prior risk factors or protective factors that could influence the onset of mental health problems after injury. Future research should investigate whether other demographic or preinjury variables are associated with the mental health of individuals with SCI.

A third limitation is that more sensitive measures could have been used to assess mental health in this sample. Although the PHQ-9 is established to be a reliable and valid self-report measure of depressive symptoms, it is not as strong an index of depression as a clinician-given formal diagnosis would be [50]. Similarly, a measure assessing generalized anxiety disorder or posttraumatic stress disorder could have been used, but since the STAI has been translated into and validated in Spanish,

the STAI was used for this study. Researchers have argued that specific instruments measuring mental health need to be created for individuals with SCI to take into account physical impairment [14], which would make a valuable addition in future studies.

A fourth limitation is that participants in this study were from Colombia, and thus an appropriate degree of caution should be exercised when generalizing results to all individuals with SCI in Latin America. Additional studies should be conducted in regions outside of the United States, Western Europe, and other developed countries to help broaden the understanding of how SCI affects patients' mental health in diverse global regions.

## CONCLUSIONS

Despite these limitations, the current study highlights some of the mental health issues faced by individuals with SCI in Colombia. In Latin America, SCI rehabilitation services are extremely sparse and rarely include interventions that target mental health postinjury. The current study suggests that satisfaction with life and depressive symptoms are two important variables that co-occur with SCI and warrant attention in rehabilitation services, especially in this region.

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